

REMARKS

This responds to the Office Action dated January 10, 2005, in which claims 1-21 of the present application were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,703,832 to Heaton et al. ("Heaton"). Applicants respectfully traverse.

The Heaton reference discloses a method for detecting fines invasion in a formation surrounding a wellbore includes acquiring at least two nuclear magnetic resonance measurements, each of the at least two NMR measurements acquired from a volume of investigation at a different radial depth from the wellbore; and determining whether the fines invasion has occurred by comparing the at least two NMR measurements. (*See, e.g.*, col. 2, ll. 56-68 of the Heaton patent). The reference further teaches that the NMR measurements may be used to compute porosity values for the formation. (*See, e.g.*, claim 25 of the Heaton patent). The Heaton reference, however, does not disclose, teach or even suggest that the computed porosity values may be used to detect abnormal pressure in the formation, as recited in claims 1, 15 and 19 of the present application.

The Examiner acknowledges that Heaton does not specifically mention the detection of abnormal pressure; however, in paragraph 2 of the Office Action, the Examiner asserts that detection of abnormal pressure is inherent in the detection of fines invasion, that is, fines invasion is a consequence of abnormal pressure conditions. Applicants respectfully disagree. In particular, fines invasion is very common during borehole drilling and is not necessarily a result of any abnormal pressure conditions in the reservoir. For example, the fines may filtrate into the formation if the pressure of the mud column exceeds pressure of the formation, which may be at the hydrostatic pressure level, *i.e.*, not abnormal. In another example, fines invasion may occur due to the insufficient thickness of the mud cake surrounding the borehole or due to the improperly computed density of the drilling mud. In yet another example, fines invasion may not occur at all if the formation is at abnormally high pressure, *i.e.*, it is over-pressurized. Therefore, fines invasion is not inherently a consequence of the abnormal formation pressure conditions, as asserted in the Office Action.

In fact, the Heaton reference itself teaches away from this line of reasoning:

"These drilling fluids are typically pumped at high pressure in order to prevent formation fluids from gushing into the well before the well is completed. Because the drilling fluids are at higher pressures than the formation pressures, these fluids may filter into the formation mud filtrate invasion. In addition, fines suspended in the drilling muds may also invade the formation." (*See*, col. 2, ll. 20-26).

The above passage from the Heaton reference indicates that the high pressure of the drilling fluid, rather than any abnormal formation pressures, causes fines invasion into the formation. Applicants, therefore, respectfully submit that the presumption in the Office Action that fines invasion is an inherent consequence of abnormal formation pressure is incorrect. Accordingly, the Heaton reference does not anticipate claims of the present application.

However, even assuming *arguendo* that the fines invasion is a consequence of the abnormal pressure conditions in the formation, mere determination of such an invasion from porosity measurements alone, as taught by Heaton, is not sufficient to anticipate the claims of the present application because such a teaching is not enabling. The Heaton reference does not disclose at all how to process the computed porosity values to detect the abnormal formation pressure, and the Office Action, except for a conclusory statement in paragraph 2, fails to provide any prior art that would support such a position. Furthermore, the reference does not disclose, teach or even suggest that the abnormal formation pressure may be estimated from clay-bound water volumes, as recited in claim 15 of the present application. In view of the above, claims 1, 15 and 19, as well as claims dependent thereon, are patentable over the Heaton reference.

Information Disclosure Statement

Applicants submit herewith for consideration by the Examiner an Information Disclosure Statement and a list references. Applicants respectfully request the Examiner to enter the cited references into the record of the present application.

Conclusion

On the basis of the above it is respectfully submitted that the present application is in a condition for allowance. A favorable disposition to that effect is respectfully requested. Should the Examiner have any questions or comments concerning this submission, the Examiner is invited to call the undersigned at the phone number listed below.

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Respectfully submitted,


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